

REMARKS

Claims 17-23 and 25-29 have been rejected under 35 U.S.C. 103 as being unpatentable over Peters, et al. (U.S. 6,379,536) in view of Aubert, et al. (U.S. 6,214,306). The Examiner states that Peters does not disclose the addition of a mixed cerium and zirconium oxide in the composition, although Peters discloses the use of ceria. The Examiner applies Aubert as disclosing a catalyst composition based on the zirconium and cerium oxides. The Examiner concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Peters invention by adding a mixed zirconium oxide and cerium oxide, as suggested by Aubert into the composition. The rejection is respectfully traversed.

Peters discloses a NO_x reduction composition containing an alkaline metal or alkaline earth metal which is not part of the claimed invention, a transition metal oxide having oxygen storage capability such as ceria, and a transition metal selected from Group 1b and/or 2b which is part of the claimed invention. The Examiner is correct in that Peters does not disclose the use of a mixed oxide of cerium and zirconium. The Examiner utilizes Aubert to meet the limitation of a mixed oxide of cerium and zirconium and suggests it would be obvious to replace the cerium oxide of Peters with the solid solution of zirconium oxide and cerium oxide of Aubert, inasmuch as Aubert discloses that these materials can be used in catalysis. Essentially the Examiner is stating that ceria and a mixed oxide of cerium and zirconium, are equivalent and/or the broad suggestion that the solid solution of cerium oxide and zirconium oxide in Aubert would have known

advantages in removing NO_x in an FCC process. It are these latter conclusions, explicit or implied by the Examiner over which the Applicants strongly disagree. There is no suggestion in any of the applied references that ceria and a mixed oxide of cerium and zirconium are equivalent. Just as importantly, Aubert does not disclose the advantages that Applicants have found using a mixed oxide of cerium and zirconium in an FCC process for NO_x reduction. While Aubert discloses that his cerium and zirconium mixed oxide or solid solution can be used in a wide variety of catalytic operations, the patent does not otherwise suggest that this material could be a replacement for ceria in a NO_x reduction FCC catalyst as in Peters. Importantly, Applicants have found that the mixed oxide of cerium and zirconium yields improved stability in FCC processing. Thus, it is Applicants' position that while mixed oxides of cerium and zirconium with other optional oxides or rare earths have found extensive use in automotive exhaust catalysts, the stability which Applicants have found in FCC processing has not been known prior to this invention, and is certainly not suggested in the broad recitation of possible catalysis provided by a mixed oxide of cerium and zirconium in Aubert. In particular, Aubert does not remotely suggest the results which are shown in Table 1 of the present application in which the mixed oxide of cerium and zirconium alone, or with other of the claimed components, has an improved NO uptake as well as improved surface area retention and NO retention after steaming, which represents an aged catalyst during FCC. None of this data is remotely suggested in the broad disclosure of Aubert. Accordingly, the use of a cerium/zirconium mixed oxide as a substitute for ceria in the NO_x reduction catalyst of Peters yields results which are unexpected from a reading of the applied art. The Examiner simply cannot ignore the improved results which Applicants have found in a

catalyst for a specific environment, which results are not suggested in Aubert.

Accordingly, it is believed that the claimed method of reducing NO_x emissions utilizing the claimed catalyst yields results which are not expected from the applied prior art either singularly or in combination. The fact that the catalyst of Aubert can be washed and then heated to remove water is not at all the same as the steaming conditions which represents the aging of a catalyst in FCC processing as is notorious in the FCC art.

The Examiner states that Aubert discloses a composition based on zirconium and cerium oxides and achieves NO_x reduction. The patent is not at all specifically concerned with NO_x reduction. The patent states in a paragraph at column 7, lines 50-63 that the catalytic system has a great many applications and essentially lists every catalytic process imaginable. There is no specific reference to NO_x reduction and certainly no specific reference to NO_x reduction in an FCC process wherein the mixed oxide of cerium and zirconium has improved stability over ceria or zirconia alone as shown in the present application. Withdrawal of the rejection is respectfully requested.

Claims 17-23 and 25-29 have been rejected on the ground of non-statutory obviousness type double patenting as unpatentable over claims 1-9 of U.S. Patent No. 6,852,298. The rejection is respectfully traversed.

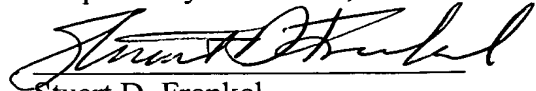
The instant claims are not at all claiming the same subject matter as claims 1-9 of U.S. 6,852,298. While the '298 patent and the instant claims are directed to reducing NO_x emissions in an FCC process, the catalyst compositions for doing so are different. In

the '298 patent, a mixture of cerium oxide and an oxide of a lanthanide series element other than ceria is claimed and the ratio of the cerium oxides to the other lanthanide oxide is specifically set forth. The presently claimed invention is not directed to ceria but is directed to a solid solution of a mixed oxide of cerium and zirconium. Data in the application clearly indicates an improvement of the mixed oxide of cerium and zirconium over ceria alone. Accordingly, it would not be obvious to substitute a mixed oxide of cerium and zirconium for the ceria alone of the patent. The addition of the zirconium is not for a minor purpose, but as shown in the data of the application yields vastly improved results over ceria alone with regard to stability of the catalyst during FCC processing. Inasmuch as the claimed inventions of the present application and the '298 patent are directed to different compositions, and inasmuch as Applicants have shown unexpected results with respect to a mixed oxide of cerium and zirconium with respect to ceria alone, the obviousness type double patenting rejection is simply improper and Applicants respectfully request it be withdrawn. Again, Aubert conducting washing, drying, and even calcining of the cerium and zirconium oxide to form a final catalyst is not at all equivalent to steaming a catalyst which is notorious for representing an aged catalyst in FCC processing. Aubert does not at all disclose the advantages of a mixed oxide of cerium and zirconium in FCC processing.

For the above reasons, it is believed that claims 17-23 and 25-29 patentably distinguish over the art of record and Applicants respectfully solicit favorable action on these claims.

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Respectfully Submitted,



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